

CSIR's Health Assistive Devices (HADs) and Personal Protective Equipments (PPEs)



Council of Scientific and Industrial Research
Anusandhan Bhawan, New Delhi – 110001
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CSIR, India in fight against COVID-19

Team CSIR working on multiple segments in the cause to fight against the pandemic COVID-19



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Personal Protective Equipments

PPE 1	: Face shield	CSIR-CSIO
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PPE 3	: Personal Protective Coverall	CSIR-NAL
PPE 4	: Ampricare : Sanitizer for daily use	CSIR-AMPRI
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Respiration Assistance Intervention Device A Portable Ventilator (*Respi-AID*)



CSIR-CSIO

- The Respiration Assistance Intervention Device (Portable Ventilator) is based on the operation of Ambu Bag, which is used conventionally for manual respiration.
- Automated Ambu bag operation is based on double flap motorised mechanism.
- Provision to set the following input parameters for functioning of the device:
 - ✓ Volume of gas to be delivered to the patient (Tidal Volume)
 - ✓ Rate at which the gas is to be delivered to the patient (Respiration Rate)
 - ✓ Inspiration to Expiration ratio (I:E Ratio)

Broad Specifications

Ventilation modes:

- Adult mode and Paediatric
- Control mode – CMV

Ventilation parameters:

- Tidal volume : 200-800 mL
- Respiratory rate : 5-30 BPM
- Pressure : 0 – 40 cmH₂O
- Oxygen : 21 – 100 %
- I : E Ratio : 1:1, 1:2, 1:3, 1:4

Features:

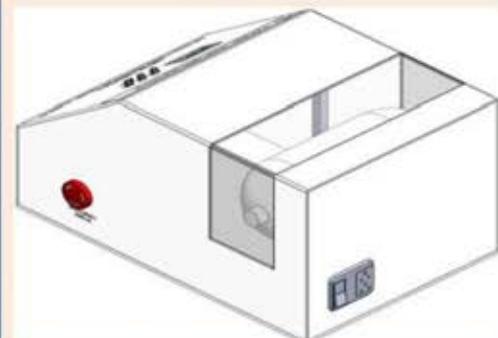
- LCD Display 2.8"
- Provision for setting of Respiratory Rate, Tidal Volume and I : E Ratio through Potentiometers and Push-to-ON Switch
- GUI for monitoring of set and delivered values of Tidal Volume, Respiratory Rate and I : E Ratio
- Alarm for delivered Tidal volume mismatch by $\pm 10\%$ of the set value
- Alarm for power failure

Input Gas Sources:

- Environmental Air
- Hospital Supply
- Oxygen Gas Cylinder

Power Source:

- Standard 230V AC single phase 50 Hz supply
- Battery backup for alarm operation



Respiration Assistance
Intervention Device (*Respi-AID*)

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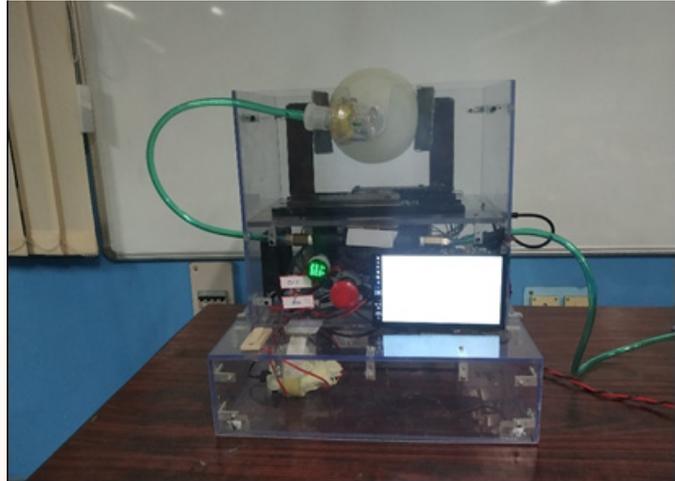
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Type - A Ventilator

Product Description:

The Mechanical Ventilator is designed to provide support to the patient in either Invasive or Non-invasive way. The Mechanical ventilator provides Intermittent Positive Pressure Ventilation (IPPV) and which is controlled and monitored with the help of a control system, sensors (flow and pressure), display and alarm. The device delivers air to the lungs at breathing rate and tidal volume which is user defined. The device run with a Volume Assist/Control mode hence it can be used for both partially active and passive patient. Power is typically supplied from a power line or an UPS. This ventilators may be used for long-term respiratory support in extended care facilities and in the home, they may also be used in emergency care.



The basic model is open loop in nature, meaning it does not identifies the breathing effort of the patient. Therefore, it can only be used in passive patients.

Principles of operation:

In the developed prototype any adult AMBU bag (volume: 1600ml) can be used. The AMBU bag is compressed with the help of 2 arms which are fixed on the Rack. The Rack is actuated with the help of a Pinion which is driven with the help of stepper Motor. The required volume needed by the patient is controlled by changing the displacement of the 2 arms present. An oxygen cylinder can be attached to the AMBU bag with the help of a pipe so that required amount of FiO₂ can be controlled. The Ventilator uses Volume Assist/Control Mode and it responds to patient triggering by sensing the pressure. The prototype comes with alarm which get triggered when the pressure limit crosses or when the mechanism stops due to unforeseen circumstances. The prototype also has a feedback system which helps in reducing the pressure supplied to the lungs hence protecting the lungs from serious damage.

Specification:

Dimension : 300mm x 280mm x 330mm
 Weight : ~5Kg
 Tidal Volume : 350-450ml (Adjustable in steps of 50 ml)
 Breathe Rate : 12-25 BPM (Adjustable)
 I:E Ratio : 1:1, 1:2, 1:3 (Selectable)

Use & maintenance:

User(s): Physicians, nurses, respiratory therapist, other medical staff
 Maintenance: Manufacturer/Service Engineer

Testing & Certification (if applicable)

The basic performance and usability of the prototype will be tested as per the following guidelines:

- ISO 80601-2-12: 2020-02: Medical Electrical Equipment - Part 2-12: Particular Requirements for the Safety of Lung Ventilators - Critical Care Ventilators

Further Work:

The following work is going on to improve the system performance:

- Breathe Cycle detection of a partially active patient through pressure sensing
- Post detection, supply of required quantity of air under Volume Assist/Control Mode during inhalation while monitoring that the PIP should not go beyond 40 cm of H₂O. Maintain a PEEP of 5 cm of H₂O during the exhalation.
- Integration of different pressure sensors in the circuit and inbuilt all the control logic in the micro-controller



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Bi level Positive Airway Pressure System (Bi+AP V1)

Portable Ventilator for COVID19

- Three modes of operation- Continuous, Timed and Spontaneous
- Automatic and Manual operation
- Easy to use User Interface
- Programmable respiration cycles
- Statistics of each patient for diagnostics



Parameters	Specificaation
Pressure range	4 - 25 cm H ₂ O
Starting ramp	4 to EPAP min
Breath rate	0 - 30 beats per minute
Ramp time	0 to 45 min (5-min increments) min
Data storage capacity	up to 3 months, Configurable
Electrical requirements	100-240 (50/60) VAC (Hz)
Device setup	LCD/control wheel/push button
Compliance meter	Breathing detection
Altitude compensation	Automatic(optional)
Alarm	High Pressure, Low Pressure, Cycle Time overrun. System Fault
Features	Configuration Setting for Pressure, Mode of operation, Rate Setting, Number of cycles
Filters	Input Foam Air Filter, Antibacterial filter



Council of Scientific and Industrial Research
National Aerospace Laboratories



Bi-Level Positive Airway Pressure System

Accessories :

1. Input Foam Filter
2. Input and output Antibacterial Filter
3. Output delivery hose
4. Mask



Basic Modes of Operation:

The System operates in the following three modes.

CONTINUOUS POSITIVE AIRWAY PRESSURE (CPAP):

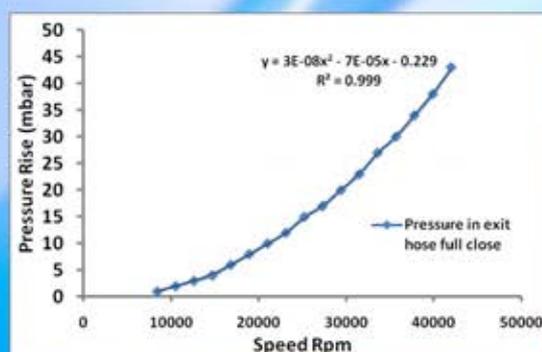
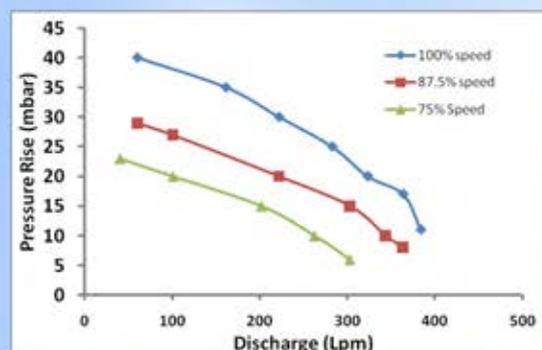
The ventilator provides Continuous fixed Positive Airway Pressure (CPAP).

TIMED MODE:

The ventilator provides timed breath delivery with Pressure Support Ventilation. The unit cycles between the IPAP and EPAP levels based solely on the timing intervals

SPONTANEOUS/TIMED (S/T Mode):

The ventilator provides spontaneous or timed breath delivery with Pressure Support spontaneous Ventilation. The unit cycles between the IPAP and EPAP levels in response to patient triggering. This mode synchronizes patient breath cycle with the ventilation mechanism.



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Intubation Box to access the patients by Medical Professionals

- With the recent global outbreak of COVID-19, many infected patients develop respiratory failure requiring endotracheal intubation.
- Since COVID-19 is transmitted via droplets and aerosol, healthcare providers who are intubating these patients are at high risk of contracting this deadly virus during the intubation process.
- To protect healthcare providers from this virus during the intubation process, Dr. Hsien Yung Lai, an anesthesiologist from Mennonite Christian Hospital in Hualian, Taiwan, has designed the Aerosol Box that effectively shields a provider's face from a patient's airway, while allowing the provider to move his/her arms freely to perform all necessary tasks during endotracheal intubation.

Advantages

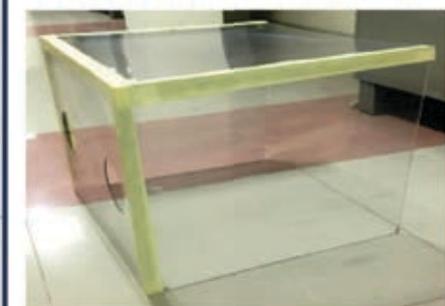
- Protection from Patients during Intubation
- Helping doctors access the patient safely
- Helping to stop the spread of this pandemic
- Box can be cleaned thoroughly with 70% alcohol or bleach, and then can be reused for the next patient

Users/Testing Partners:

- Anaesthesia & Dental Departments PGIMER, GMCH and GMSH Chandigarh



Doctor using Intubation Box



Intubation Box

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Membrane based Oxygen Enrichment Unit (OEU)



Prototype version-1

(a) Rectangular box containing membrane cartridge and accessories ; (b) Oil free Compressor

Genrich has made around 50 units of this version.

Specifications: (a) Flow type: Continuous, instant start-up, (b) Oxygen Purity: 21-35 %, (c) Flow rate: 5-7 lit/min, (d) free from pathogens, particulate matter, (e) Compact/ movable, (f) No need of trained manpower.

Use of oxygen enrichment unit for COVID-19:

- i. As per present statistics, 15% COVID patients need oxygen therapy. Out of them, only 4% need to go to the ventilator, rest can be administered lower oxygen concentration (35%, with 5 lpm flow rate) as supplementary oxygen for their speedy recovery.
- ii. Patient when administered supplemental oxygen, recovery is known to be faster in similar lung diseases (as like in COPD, where better life-style and life-duration is known in the literature, if this therapy is administered in early stages).
- iii. Number of patients going to ventilators can be reduced.
- iv. After ventilator treatment patients can be served with this unit, reducing demand on O₂ cylinders.

Advantages of OEU:

- i. Use of precise concentration with appropriate nasal cannula for O₂-enriched oxygen administration (which is not possible with pure O₂, and is managed by adjusting O₂-flow).
- ii. Oxygen therapy can be eased as 'home therapy', which is well-known in developed nations: Supplemental O₂ is necessary immediately after detection of lung disabilities (COPD, Asthma,...).
- iii. Can reach to places where O₂ cylinders are not reachable/affordable. A large number of villages/remote places can be benefitted in India.
- iv. On site generation of O₂ enriched air, portable, ease in operation (no trained manpower needed), no moving parts (only compressor needs maintenance).
- v. The product O₂ enriched air is free of viruses, bacteria and particulate matter.
- vi. Fully indigenous technology.

Post COVID: Use can be continued for COPD, asthma or similar cases with lung disabilities.

State of the art technology:

Transferred to a startup: GENrich Membranes Pvt Ltd, (<http://www.genrichmembrances.com>).
The OEU is being certified by TUV-Bangalore within a week's time.



For more information please contact, GENrich at info@genrichmembrances.com

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IR Thermometer



The handheld digital IR thermometer is developed by NCL's Venture Center Incubate, BMek. For the non-contact thermometer, mobile phone or power banks can be used as a power source. Prototype device is currently being used at NCL gate and by Pune Police for screening purposes.

Features:

- Non Contact Thermometer with Infrared Temperature Sensors
- Sensor Accuracy: 0.5°C for 0°C -50°C
- Power Source : Mobile phone or battery bank
- OLED display for better reading
- Current design is using off the shelf components
- Reads the temperature from a distance of 30mm – 70mm from Forehead

Manufacturing Partners – Bharat Electronics.

NCL is working with Bharat Electronics for mass production of IR thermometers. First 100 units will be tested and sent to TUV Rhineland for certification. Mass manufacturing will be carried out in subsequent phases.

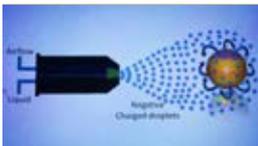
For manufacturers, the design of IR thermometers, complete know-how, and mass manufacturing ready hardware and software design is available under “Creative Commons Attribution – Non Commercial – ShareAlike 4.0 International Public License”. This is an effort to enable a large number of manufacturers to manufacture the thermometers and cater to their local demands. Readily available designs will save their time in R&D and allow interested manufacturers to start producing IR thermometers immediately. Manufacturers interested in this design can get in touch with Tech transfer COVID-19 helpdesk at <http://www.techex.in/>

Individuals and institutions can avail the design with off the shelf components and can create their own IR thermometer for their local use. It uses only three components and can be easily assembled with minimal facilities requirement. This DIY design can be available at Venture Centre Protoshop website at <http://www.protoshop.in/do-it-yourself-diy-ir-thermometer/>



For more information please contact, BMek at info@bmek.in

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Pathogens!
- No place to hide



COVID-SPRAY

(ELECTROSTATIC DISINFECTION MACHINE)

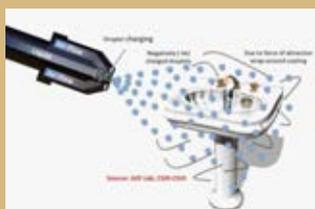


Designed and Developed
by
CSIR-CSIO, Chandigarh



CONVENTIONAL Vs ELECTROSTATIC DISINFECTION

FEATURES



- 180° Area coverage
- Bigger droplet size
- Not target oriented
- Off-target losses
- Non-uniformity
- No back deposition
- Applicable for low viscous fluids
- Less efficient
- Low accuracy

- 360° Area coverage
- Smaller droplet size
- Target specific
- Minimum losses
- Uniform coverage
- Front and back deposition
- Applicable for all fluid types
- 7-8 times more efficient
- High accuracy

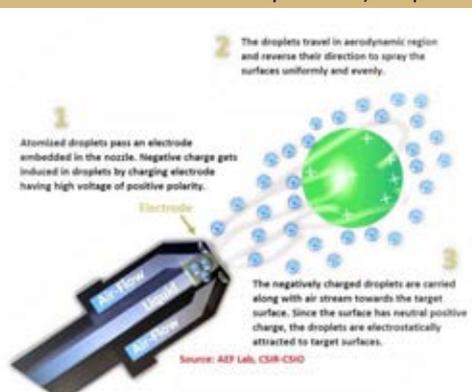
- Based on electrostatic charging.
- Globally competitive, at par with international standards
- Charged sprays are more effective and efficient to kill the virus and microorganisms.
- No. of nozzles = Single headed
- Efficiency¹ = 70-75 %
- Tank capacity = 10/15 litres
- Materials usage² = Reduced by 50-60%
- External air supply = Required
- Uniformity coefficient = 1.71
- Battery usage hours³ = 10-12 hours

¹Compared to traditional application methods including wiping.

²Compared to misting, sprayers and foggers.

³Once fully charged battery.

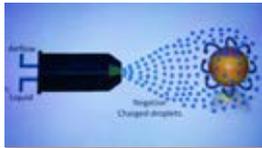
Power source for charging of liquid and air compressor is 9.0 Volts DC battery and 220-240 Volts AC (mains operated) respectively.



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What's dangerous is not to evolve



Pathogens grow exponentially



WORKING PRINCIPLE

A mixture of water and compressed air passes through the charging electrode and then charged spray droplets eject from the nozzle tip.

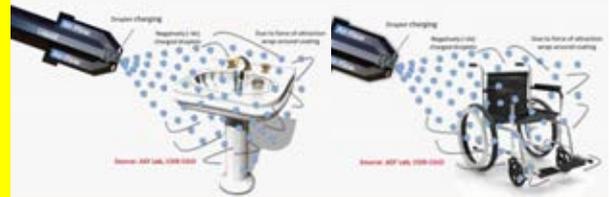
The negative charge impinged into the droplet enables it to cover the complex and hidden surfaces uniformly.

The innovative electrostatic sprayer delivers disinfectant solution to the front, back and sides of the surface. It provides uniform coverage for better germ protection.



REASONS FOR DISINFECTION

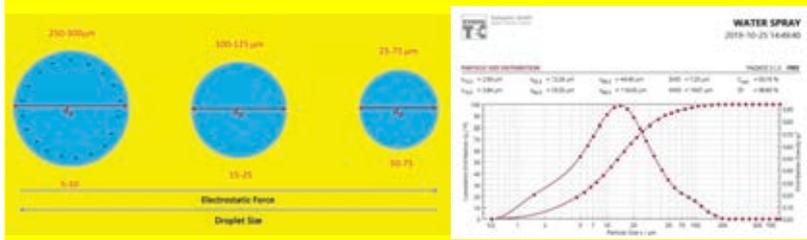
Surfaces not regularly disinfected can become a hotbed for pathogen growth.



Protect your facility with a revolutionary system that helps to reduce pathogens, viruses like never before.

- Only 50% of space in hospitals is effectively disinfected.
- Approximately 85% of wheelchairs in hospital are contaminated.
- More than 50% of beds and mattresses are contaminated.
- Approximately 92% of curtains are contaminated even after one week of laundry.

Like charges repel → More uniformity
 Unlike charges attract → More efficient



APPLICATIONS

23,582 Government Hospitals, 25,650 Primary Health Centres, 5,624 Community Centres

Healthcare

Rapidly growing with an annual growth rate of 10.5%

Public transport

21 million cases of stomach flu each year

Fruits and Vegetables

Poultry

To cure bacterial diseases, histoplasmosis, Avian Influenza

Airports and Railways

Indian railways transports about 14 million passengers on 9000 trains everyday

Hotels and Catering

Disinfection and sanitization is the utmost priority in this sector

Workplace and Offices

Tables, Chairs, Desks, Doors, Walls, Lockers, Beds, Wheelchairs, Furniture, Carts, Almirah



Overdose
 Charged spray droplet reduces overspray and other ambiguities

Uniformity
 Electrostatic disinfection machine uses less material and achieves more uniform coverage



Droplet Size
 Produces uniform droplets, which is more effective in killing the pathogens

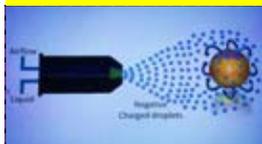
Efficiency
 7-8 times more efficient than conventional spraying



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Don't Just Control Infections!

- Prevent Them



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Tractor Operated Road Disinfection Spray System

The CSIR-CMERI Road Sanitizer Unit is a tractor-mounted Road Sanitizing System. The Road Sanitizer has a span of 16 feet, which uses 10 to 15 bars of pressure to ensure effective delivery of the sanitizer. 12 nozzles are used to ensure optimum radial coverage of sanitizer. The system utilizes a 2000-5000 litre tank with a pump of 22 LMP which can be used to sanitize a road stretch of upto 60-100kms.

This Road Sanitization unit can be effectively deployed in long stretches of highways, vicinity of toll plazas etc, where there is a massive volume of traffic and good chance of infection spreading. It can also be deployed in Housing Complexes, Office Complexes, Sports Arenas, Apartment buildings etc. This product will ensure maximum sanitisation coverage within minimum possible time, which is the need of the hour. There is also an in-built provision of two extendable hand spraying systems with a reach of 30 feet on both sides of the Vehicle. This provision can be used to reach remote nook and corners on any given site.

Asansol Municipal Corporation after Inspection of the Unit has placed an order for four such systems, of which one has already been delivered. Durgapur Municipal Corporation has also expressed interest for the Unit and procedural negotiations are under progress. Some MSMEs and Small Business Clusters have also expressed interest for the Unit and interactions are underway for the same.



Tractor operated road disinfection spray system

The Technical Configuration of the Unit are as follows:

- Pump Spray Capacity : 30 Litre/min
- Line Pressure : 10-15 bars
- Tank Capacity : 2000-5000 litres
- No of Nozzles : 6 Nos at the rear end and 3 on each side (Left and Right)
- Road Width Coverage : 16 feet on each run
- Road Speed during Spray : 5-10 km/hr
- Spray Mixture : Water and Sodium Hypochlorite Solution-6%

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Disinfection Walkway



Delegates from DMC visiting Disinfection Walkway

Product Description:

The Disinfection Walkway can be considered to be one of the most comprehensive Disinfectant Delivery Systems available. The Walkway ensures maximum target coverage with minimum shadow area of an individual. Two variants of the Disinfection Walkway are as follows

Principles of operation:

1. Pneumatic, sensor based:

It deploys Six Bar pressure Air Compressor to ensure optimum mist formation.

2. Hydraulic based:

It deploys 1 hp pressurised motor High Velocity pump with necessary set up nozzles to ensure optimum mist formation.

Specification:

1. Pneumatic based:

- The dimensions of the Walkway: 2metre height by 2.1 metre length and 1 metre.
- Number of nozzles: 4
- Operational time: 20 to 40 sec.

2. Hydraulic based

- It deploys 1 hp pressurised motor High Velocity pump
- 2metre height by 1.7 metre length and 1.8 metre width
- Operational time: 20 to 40 sec

Use & maintenance:

As the sanitizer is water soluble, it needs periodical top-up. Operations are controlled through sensors and having no maintenance.

Testing & Certification (if applicable)

Chemical and concentration is used as per Environmental Protection Agency guideline and chemical used as per CEC guidelines.

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Optimum Concentration of Disinfectant in Walkthrough Mist Tunnels



CSIR–National Chemical Laboratory(NCL) evaluated efficacy of sodium hypochlorite, also known as hypo or bleach, ranging from 0.02% to 0.5% weight concentration on personnel walking through mist tunnel unit, besides antibacterial activity against standard microorganisms before and after exposure in the walkthrough. Results indicated that 0.02% to 0.05% weight concentration did not show an adverse effect on normal skin flora and yet destroyed the standard microbes. Thus, CSIR–NCL recommends using 0.02% -0.05 wt. % sodium hypochlorite solution (200 to 500 ppm) for external body surface sanitization of personnel walk through the mist tunnel by following standard safety precautions.

CSIR–NCL further recommends different concentrations of hypo depending on the nature of exposure to personnel. Hypo solution with 0.05% weight concentration is suggested for those exposed to the large population such as health workers, police, municipal employees, etc., and 0.02 wt. % for those in normal office spaces like inside office or factory. The use of face shields or safety goggles for safety purposes during the walkthrough is also recommended.

Mist Sanitization System unit being used in CSIR–NCL was designed by L&T Defense, Pune, and fabricated/ supplied by M/s Venkateshwara Agrotech Industries, Pune. The person is exposed for about 10 seconds while walking through 12 feet long mist sanitization tunnel that has a height of 8 feet with 24 nozzles, 12 on each side, of 100 micron diameter for spraying at two levels from side panels covering all sides of the external body.

Comparison of chlorite inhaled by a person walking through mist tunnel in 10 sec with normal daily activity of inhalation and swimming

Disinfectant concentration recommended by CSIR–NCL	Amount of mist water falling on body in 10 sec pass	Amount of chloride inhaled	Permissible safe limit of chlorine	Amount of chloride in daily activity/ products	Chlorine in daily activity compared to Mist tunnel, ratio
Sodium hypochlorite 0.02–0.05% (200 to 500 ppm)	Less than 50 mL	0.00133 mg at a dose of 500 ppm	5.4 mg per day for normal activity of adult	0.086–0.151 mg during 30 mins in swimming pool Against permissible limit of 0.522 mg	<ul style="list-style-type: none"> ▪ 4000 times higher in daily inhalation ▪ 100 times higher in 30 mins swimming



NAL GMPS - XXX.X-D/G Series Pressure Sensors



Gauge pressure sensor with SS diaphragm for measuring the pressure range from ± 5 kPa to ± 100 kPa.



True differential pressure sensor with silicone diaphragm for measuring the pressure range from ± 200 Pa to ± 2 kPa

Description

The NAL GMPS pressure sensor module is a first pressure sensor in India designed using NAL MRA 1427 – a GMR based magnetic sensing chip. The GMPS model is a compact, magneto resistive based, differential pressure sensor with both analog and digital interface. GMPS – XXX.X-D/G have wide operating range from: ± 200 Pa to ± 100 kPa. XXX.X stands for pressure range in kPa. D/G stands for pressure in differential or in gauge mode.

Principle of operation

The basic principle lies behind the measurement of the change in the magnetic field profile generated by the deflected diaphragm attached with a permanent magnet. This magnetic field profile change on the sensor surface was measured by highly sensitive magnetoresistive gradiometer sensor.

Specifications

- ❖ Giant magnetoresistance (GMR) based sensing technology
- ❖ Single polarity supply operation
- ❖ Either three or two wires analog or digital output (I2C, SPI)
- ❖ Available in wide pressure sensing ranges: ± 200 Pa to ± 100 kPa
- ❖ Wide operating temperature range
- ❖ Excellent linearity and accuracy over temperature range
- ❖ Low power consumption
- ❖ Excellent voltage and thermal stability
- ❖ EMC/ESD robustness, high voltage, reverse polarity and short circuit protection
- ❖ Available in Analog voltage output mode and Current loop mode (4 to 20 mA)

Use and maintenance

All the pressure sensors developed here are PCB mounted and can be used in continuous mode of operation. There is no regular maintenance for this product.



Jointly Developed by CSIR-NEERI, DST-ARCI and
Sowbal Aerothermics



GreenDispo (MIDI)

An Improved Eco-friendly & Energy
Efficient Electric Incinerator for
Cellulose Mask Disposal

Contribution
to SDGs



Salient Features

- Ensure instant disposal in a scientific & hygienic way
- Energy efficient heaters and innovative design of combustion chamber (Single)
- Incinerates used sanitary pads & Cellulose masks at a temperature more than 800 °C
- Optimized A/F ratio and heating cycles
- Efficiently burn masks with high cellulose content
- Exhaust emissions comply to BMW Management Rules, 2016 for use with sanitary napkins.
- Ash collected in separate tray with < 5% ash generated.
- Auto power & thermal cut-off and automatic temperature control
- Suitably insulated with safe device surface temperatures
- Easy to operate and with low maintenance.



Beneficiaries



Quarantine
Centres



Hospital and
Public Health
Centres



Convention
Centres



Office and
Industries



Schools and
Institutions



Community
Spaces

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Face Shield for Medical Professionals and Healthcare Workers



CSIR-CSIIO

- Face shields are used as second-layer protection for healthcare workers. The face mask has a short lifeline and these shields will withstand longer. CSIR-CSIIO has made two types of shields. One is disposable and the second can be sanitized and reused.
- They are easily reproducible through die-cast method ensuring low-cost solution. It takes less than 30 seconds to assembly and requires standard tools to assemble and can be transported in form of kit resulting in speedy manufacturing with minimum investment.

Salient Features

Disposable version:

- Ergonomic Design; Does not cause fogging;
- Can be worn with spectacles;
- Ultra Light Weight; No imports of raw material

Reusable Version:

- Lightweight; Better protection than masks
- Easy reproducibility through Atal tinkering labs and Universities/Institutions in the county to meet the local need.

Easy to:

- Manufacture: 3D Printing / Laser Cutting / Die Cutting
- Assemble: 30 secs , Requires standard tools to assemble
- Transport: Packaged in form of kit

Low Cost:

- OHP Sheets, Thin flexible Strips, Minimal Material Cost
- Speedy manufacturing with minimum investment

Users/Testing Partners:

- PGI & GMCH Chandigarh; Doctors/Nurses/Paramedical Staff



Design-1: Disposable Face Shield



Design-1: Disposable Face Shield



Design-2: Reusable Face Shield

For details, please contact:

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Anti-microbial Coated 3D Printable Face Shield to Protect from COVID-19



The PRICELESS GIFT to Health Care Workers

3D PRINTED FACE SHIELD



The anti-microbial coated face shields protect health care workers from the spread of COVID-19. It gives protection not only to their eyes and face from the droplet and airborne transmission that come from coughing and sneezing of COVID-19 patients, but also prevents the person from touching their face with the unconscious gestures. This face shield is prepared by anti-microbial polymer-coated materials and designed to be placed over a conventional surgical mask to protect our health care workers from COVID-19.

- Easy one-step assembly with head-band and protective shield
- Easy to sanitize and reuse
- Lightweight and durable
- Complete coverage of face than any clinical/respiratory mask
- Highly transparent
- Easy to store



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Personal Protective Coverall



Indigenous Technology for Self Reliance

Specifications

- ❖ Fabric: Polypropylene spun laminated multi-layered non-woven
- ❖ Single use
- ❖ Colour: White / Blue
- ❖ Built-in hood cap and zipper covered with flap
- ❖ Universal fit
- ❖ Size - L
- ❖ Soft elastic fitted around hood, wrist and ankles
- ❖ Shoe cover fitted with soft elastic at two levels
- ❖ Certified to ASTM F1670 / F1670M-08(2014).



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Ampricare : Sanitizer for daily use

In House Preparation of HAND Sanitizer to Combat Coronavirus Disease (Covid-19)

Introduction

- Coronavirus disease (COVID-19) resulted in serious global health concerns. The World Health Organisation (WHO) declared it a pandemic.
- Hand sanitizer is the first line weapon to prevent infection spread due to its action of killing viruses and bacteria.
- Hand sanitizer is essentially required for everyone including doctors and healthcare staff, on-field corona warriors (police, delivery man, etc.), office staff and common people.
- Commercially available hand sanitizers are very expensive.
- In this pandemic situation, increasing demand resulted in shortage of hand sanitizers.
- CSIR-AMPRI, Bhopal has taken an initiative to develop effective, skin friendly and cost effective hand sanitizers.



2 litre pack of hand sanitizer made by CSIR-AMPRI

Salient Features

- Hand sanitizer is made following WHO guidelines.
- Use of additional ingredient(s) for skin care.
- Cost effective with respect to commercial hand sanitizers.



CSIR-AMPRI made hand sanitizer packed in bottles of different sizes



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Reusable Cotton Face Mask: Affordable Akshayapatra



Corona virus mainly spreads through the micro droplets thrown out when an infected individual sneezing or coughing. The droplets can travel up to several meters and find another host. Moreover, corona virus can stay active up to several days on selected surfaces. It infects the hands when a person touches the surfaces and subsequently infects the respiratory system when touching mouth or nose. Wearing mask can prevent the virus spread to certain limit. Unlike the commercial disposable masks, the re-usable cotton masks can be disinfected and reused several times.

Unique elements:

- Training individuals (capacity creation).
- Digital training (maintained social distancing).
- Encouraging the trainees to make and distribute masks to their capacity.
- Finding sponsors for financial support.
- Creating a network of user-trainee-sponsors.

Mode of training:

- Digital classrooms through Zoom or Whatsapp.
- Classroom/presentation videos in Tamil and English.
- Telephonic conversation with videos.

Mask size	Cloth Dimension (W x L)	Frill
Small (s)	5" x 5"	½"; 2 Nos.
Medium (M)	6.5" x 7"	½"; 3 Nos.
Large (L)	7.5" x 8"	½"; 3 Nos.

Material	: 100% cotton
Number of ply	: Singly ply/Double ply
Fastening type (customizable)	: Ribbon/Elasticstrap/Velcro strap
Borders (customizable)	: Boderless/two side/four side
Packing	: 100 pieces/bundle

Directions to use (Ribbon type):

1. Tie the upper pair of ribbons first to your back head. Always use loop knot for easy untie after use.
2. Pull the mask gently down to expand the frills all the way till throat and tie the bottom pair of ribbons on the top back head.
3. Make sure there no gap for free flow of inhaled/exhaled air.
4. After the use carefully untie the knot on the top back head first (bottom pair of ribbons) and then untie the back head knot (top pair of ribbons) carefully holding the mask. Make sure the outer surface of the mask does not touch your mouth or nose.
5. After removing the mask, directly drop it into a detergent solution.
6. Do not use a wet or humid mask.

Remember:

- To still maintain at least 2 meter distance from others.
- To minimize going out and completely avoid unnecessary outing.
- To avoid touching mouth, nose & eyes when outing.
- Wash you hands thoroughly as per protocol when back home.

CSIR-Central Electrochemical Research Institute

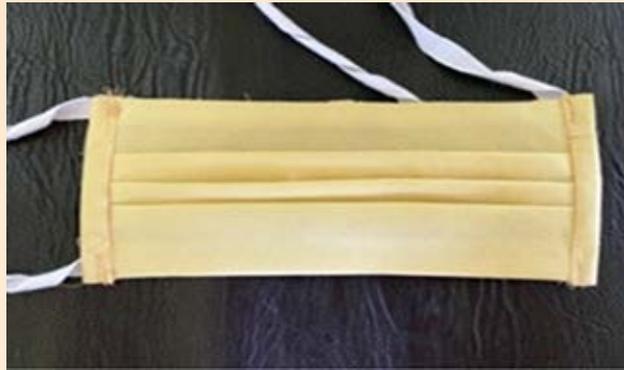
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Reusable two-layer Face Mask



Product Description:

This two-layered filter mask ensure considerable facial area coverage. The dual layered filters ensure maximum protection against external infection and user comfort. The filters can be sterilized using Ultraviolet light (UV-C). Keeping in mind the mass requirements in the present context, the cost of an individual unit has been restricted Rs 20.

Principles of operation:

It is well known fact that during coughing and sneezing the droplets of sizes of 100 μm or more carrying the lethal virus are variable dependents on the distance. Keeping these in mind, our developed masks materials are highly hydrophobic. The contact angle of $> 125^\circ$ measured at the surface of droplet. Besides, the pore size of material is another important aspect, which should be looked at. In this regard, the pore size of the used material in our developed mask is 60 μm or smaller. Furthermore, the breathability in-house test with inhalation resistance of 26 mm H₂O indicates the easy breathing while wearing the mask.

Specification:

The filter media can resist aerosol penetration and owing to its hydrophobic properties, the virus infested aerosols can be blocked-off at its very entry point.

The filters can resist upto 90% of contaminated aerosols.

Use & maintenance:

Reusable under proper disinfection.

Testing & Certification (if applicable)

Under process



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SAKSHI Masks - Improving lives with science



Functional cotton based masks

CSIR -NEERI developed process know-how for treated cloth and functional cloth (polymeric cloth composites) for producing " Antimicrobial Masks" . Treated and functional cloth are prepared by simple dip coating technique . The usage of masks reduces the chances of inhaling the virus which shall be vital in stopping its spread. Usage of simple home made treatments and functional materials in masks enhances the chances of sorbing /arresting & destroying bioaerosols

Functional cotton based masks

- ❖ Enhanced potential for capture of bioaerosol
- ❖ Simple and easily made at home with available cotton materials
- ❖ Cotton based masks are reusable and maybe of multiple use
- ❖ Easily cleaned after use with ingredients available at home including vinegar, surfactant etc., sterilization and sun drying

Salient features of masks

- ❖ Treated cotton cloth based masks (as per WHO design) with simple homemade treatments including salt, surfactant, vinegar treatment, steam sterilization, ironing, sun drying etc. (expected unit cost is Rs 5/-)
- ❖ Functional biopolymeric cloth have been prepared for preparing masks with and without using functional molecules like turmeric, Cu and surfactant singly or in combination., (expected unit cost is Rs10 /-)
- ❖ Typical capacity – 1000 masks /day

Novel features of masks

- ❖ Hygienised product for use as masks
- ❖ Minimal environmental footprint :Biodegradable materials used
- ❖ Most reliable for protection against bioaerosols
- ❖ Hassle free operation, minimum maintenance and light weight
- ❖ Can be incinerated or easily carbonized for destruction when required to be disposed

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Face Masks towards fighting against Coronavirus (Covid-19)

Introduction

- Coronavirus (COVID-19) is posing a serious risk to human health.
- World Health Organisation (WHO) has declared Coronavirus (COVID-19) a pandemic.
- Health ministry advised people to cover their nose and mouth with homemade reusable face mask for protection.
- Some of the states have made facial masks compulsory for anyone going out of their house.
- Increase in demand of face masks resulting in shortage of masks.
- CSIR-AMPRI, Bhopal has taken an initiative of development of face masks which can be easily availed by the common people.



Baby mask

Salient Features

- Double layered (size approximately 8 inch x 7 inch for adults and 4 inch x 3.5 inch for babies).
- Made of Hosiery cotton and cotton fabric which is easily available and suitable for Indian weather conditions.
- Can be used for longer duration without causing any discomfort.
- Washable and Reusable.
- Size of mask ensured so as to provide minimum exposure and maximum protection.
- Elastics have been used to facilitate adjustability.
- Reduce the risk of people without symptoms transmitting the virus through speaking, coughing or sneezing.
- Better than not using any mask and offer some protection especially where social distancing is difficult to maintain



Mask for adults



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CSIR STRATEGY

CSIR is uniquely placed as an S&T organization to deliver these at this critical juncture, having proven expertise in sequencing (first human genome sequencing), diagnostics for rare genetic diseases and being the fountain head of generic industry in the country.

CSIR has advantageously positioned itself to pursue the focused R&D to develop, integrate, scale-up, and deploy necessary technological interventions for combating Coronavirus pandemic in the country. Considering the multifarious problems created by coronavirus which require interventions in several areas and multi-pronged strategy, CSIR has set up five technology verticals for addressing the emerging situation due to pandemic.

These verticals are need based and span multiple research labs and disciplines and draw upon the strength of scientists, students and harness it for the fight against COVID-19. In addition, CSIR is also working on promoting rural employment and providing ready to eat food to migrants and other outreach programs.



To Fight COVID19

The Five Verticals

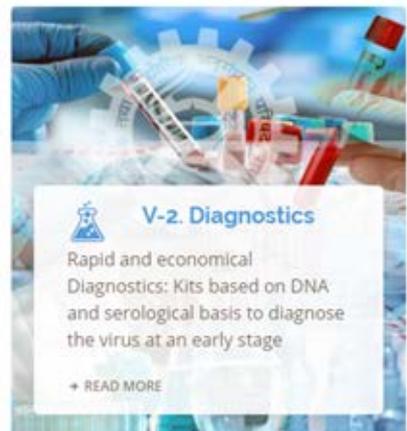
- V1: SURVEILLANCE
- V2: DIAGNOSTICS
- V3: DRUGS
- V4: HOSPITAL ASSISTIVE DEVICES
- V5: SUPPLY CHAIN



V-1. Surveillance

Including digital methods: to understand the genetic basis and develop strategy to combat COVID-19

[→ READ MORE](#)



V-2. Diagnostics

Rapid and economical Diagnostics: Kits based on DNA and serological basis to diagnose the virus at an early stage

[→ READ MORE](#)



V-3. Drugs

Development of new therapies, including repurposing of drugs and new drugs: Vaccine development

[→ READ MORE](#)



V-4. Hospital Assistive Devices

Cheap Hospital assistive devices and Personal Protective Equipment (PPE)

[→ READ MORE](#)



V-5. Supply Chain

Supply chain management and logistics with regard to availability of materials and resources.

[→ READ MORE](#)

CSIR RESEARCH PARTNERSHIP

CSIR being aware that the task is formidable and cannot be accomplished alone, is working in close synergy with other government departments, ministries and agencies on one hand and on the other is hand with Industry, MSMEs and others for scale up, delivery and implementation.

